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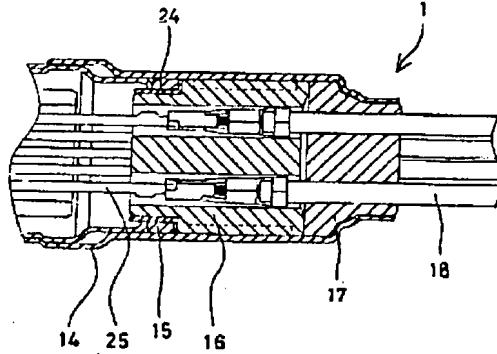
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(54)【発明の名称】ガスセンサ

(57)【要約】

【課題】ガスセンサにおいて、セバレータの変形を押さえ、外筒と保護外筒との間のシール性を向上させる。

【解決手段】ガスセンサ1は、検出素子11の電極部11bに繋がったリードフレーム25と、リード線18との接続部を保護するセバレータ16を備え、この周囲にゴムパッキン15を設けることにより、外筒13と保護外筒14との間から内部に水や油等が進入することを防止している。ここで、セバレータ16とゴムパッキン15との間に金属製の保護カバー24を設けることにより、セバレータ16の変形を防止できる。その結果、セバレータ16の変形により、外筒13とゴムパッキン15との間及び、保護外筒14とゴムパッキン15との間に空間が生じ、シール性が向上する。



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【特許請求の範囲】

【請求項1】 軸方向の一端に検出部が形成され、他端には前記検出部の信号を外部に取り出すための電極端子が接続された検出素子と、前記検出素子の軸方向中心部を収容孔内に保持する筒状の主体金具と、前記主体金具に対して、前記検出素子の前記電極端子側に接合され、前記検出素子の前記電極端子側端部を包囲する外筒と、前記外筒の、前記主体金具とは反対側開口部を外側から閉塞すると共に、該開口部から突出した前記電極端子とリード線との接続部を保護するために、前記電極端子及び前記リード線を挿通するための孔を有する樹脂製セバーラークと、前記樹脂製セバーラークから導出された前記リード線が内押されると共に、前記樹脂製セバーラークの周囲を保護する様に配置された保護外筒と、前記リード線が気密に内押され、前記保護外筒において前記樹脂製セバーラークに対して前記外筒側とは反対側開口部から気密にシールするゴムキャップと、前記樹脂製セバーラークと前記外筒との間に配置され、前記保護外筒と前記外筒との間を気密にシールするゴムパッキンであって、前記ゴムパッキンと、前記樹脂製セバーラークの間には、金属製の保護カバーが配置されていることを特徴とするガスセンサ。

【請求項2】 前記ゴムパッキンがフッ素ゴムであることを特徴とする請求項1記載のガスセンサ。

【請求項3】 前記金属製の保護カバーは、筒部と、該筒部の軸方向一端側で周囲に張り出した鈎部とからなり、前記筒部は前記外筒の開口部に挿通され、前記鈎部は前記セバーラークの端面に接していることを特徴とする請求項1又は2記載のガスセンサ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、自動車の内燃機関等の排気管に取り付けられて、排気管中を流通する排気ガス中の被検出成分を検出するのに用いられるガスセンサに関する。

【0002】

【従来の技術】従来ガスセンサとしては、例えば図4に示すような酸素センサ2が知られている。即ち、酸素センサ2は、先端に検出部11a(以下、酸素センサ2において中心部から検出部11a方向を下方側と呼ぶ)が設けられ、後端に電極部11b(以下、酸素センサ2において中心部から電極部11b方向を上方側と呼ぶ)が設置された長板状の検出素子11と、検出部11aが突出した状態で検出素子11を保持し、検出部11aが測定ガス雰囲気中に晒されるように排気管に取り付けられる筒状の主体金具12と、電極部11b側に主体金具12の同軸状に接続された中空円筒状の外筒13とを備え

ている。

【0003】このうち外筒13内には、絶縁碍管20を介して検出素子11を保持する絶縁ホルダ23を備える。そして、絶縁ホルダ23は、タルク粉末21と固定部材22とを介して主体金具12に取り付けられている。また、主体金具12の下方側端部には、検出部を囲むように被せられた有底筒状の二重のプロテクタ19a及びプロテクタ19bが、同軸状に取り付けられている。

【0004】一方、酸素センサ2は、外筒13内で検出素子11の電極部11bに電気的に接続され、外筒13の上方側開口部から上方に引き出されたリードフレーム25と、このリードフレーム25に電気的に接続され、外部にさらに引き出されたリード線18とを備えている。

【0005】なお、リードフレーム25とリード線18との接続部分は、セバーラーク16によって保護されている。セバーラーク16は、樹脂製の材質からなり、径の異なる二種の円柱を、中心軸を揃えて重ねた形状を有している。そして、セバーラーク16はリードフレーム25の電極端子及びリード線18を挿通するために軸方向に貫通した孔を複数備えており、その孔の内部でリードフレーム25とリード線18との接続部を保護しているとともに、リード線同士の短絡を防止している。なお、このセバーラーク16は、径の小さい側を外筒13に挿入し、その挿入接合部分及びセバーラーク16の周囲が保護外筒14により囲まれている。また、外筒13及び保護外筒14の間の気密性を保持するために、リング状のゴムパッキン15が、セバーラーク16の径の小さい円柱の外周に装着されている。

【0006】また、保護外筒14の外筒13側とは反対側開口部は、ゴムキャップ17により気密にシールするように配置されている。なお、ゴムキャップ17はリード線18を気密に内挿している。

【0007】

【発明が解決しようとする課題】ところで、上記酸素センサは使用時に高温にさらされるため、ゴムパッキン15は温度変化による熱膨張及び熱収縮が起こる。このためゴムパッキン15は圧縮応力のかかっているセバーラーク16を変形させることがあった。なお、この時のセバーラーク16の変形は、ゴムパッキン15がセバーラーク16に対して径方向に圧縮応力をかけているため、縮径する。またゴムパッキン15は軸方向において上方側からセバーラーク16により、下方側から外筒13により挟まれている。そのため、ゴムパッキン15の熱膨張及び熱収縮により、若干ではあるがセバーラーク16は軸方向にも変形する。

【0008】その結果、セバーラーク16の縮径に伴いゴムパッキン15も縮径するため、保護外筒14とゴムパッキン15との間に空間が生じる。また、ゴムパッキン

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15は軸方向に変形したセバーラー16の端面に張り付く形で移動するため、外筒13とゴムパッキン15との間に空間が生じる。したがって、外筒13と保護外筒14の間のシール性が悪化する。このため従来はセバーラーにゴムパッキンの熱膨張、熱収縮による影響を受けない耐熱樹脂（例えばPEEK材）を使用する必要があり、コスト高になっていた。またセバーラーをセラミックなどの材料により形成することで、課題を解決することも可能であるが、セラミックは外部からの衝撃で割れるという問題があり、また、重いという問題もあった。

【0009】そこで本発明では、従来のガスセンサに使用していた高価な耐熱樹脂製セバーラーを用いることなく、確実にシール性を維持することができ、ひいては、従来のガスセンサに比較して、より安価なガスセンサを提供することを目的とする。

【0010】

【課題を解決するための手段、発明の効果】かかる目的を達成するためになされた請求項1に記載の発明は、軸方向の一端に検出部が形成され、他端には前記検出部の信号を外部に取り出すための電極端子が接続された検出素子と、前記検出素子の軸方向中心部を収容孔内に保持する筒状の主体金具と、前記主体金具に対して、前記検出素子の前記電極端子側に接合され、前記検出素子の前記電極端子側端部を包囲する外筒と、前記外筒の、前記主体金具とは反対側開口部を外側から閉塞すると共に、該開口部から突出した前記電極端子とリード線との接続部を保護するために、前記電極端子及び前記リード線を挿通するための孔を有する樹脂製セバーラーと、前記樹脂製セバーラーから導出された前記リード線が内挿されると共に、前記樹脂製セバーラーの周囲を保護する様に配置された保護外筒と、前記リード線が気密に内挿され前記保護外筒において前記樹脂性セバーラーに対して前記外筒側とは反対側開口部から気密にシールするゴムキャップと、前記樹脂製セバーラーと前記外筒との間に配置され、前記保護外筒と前記外筒との間に気密にシールするゴムパッキンであって、前記ゴムパッキンと、前記樹脂製セバーラーの間には、金属製の保護カバーが配置されていることを特徴とする。

【0011】即ち本発明（請求項1）のガスセンサでは、セバーラーとゴムパッキンの間に金属製のカバーが設けられているため、ゴムパッキンが熱変形を起こしても、セバーラーに圧縮応力が加わらない。それゆえ、セバーラーが変形を生じなく、セバーラーの変形に伴うゴムパッキンへの影響がない。その結果、外筒とゴムパッキンとの間及び、保護外筒とゴムパッキンとの間に空間が生じることがなく、外筒と保護外筒との間のシール性が維持できる効果が得られる。

【0012】ここで、ゴムパッキンの材質としては、弾性を有しており、2つの部材の間のシール性が確保できるものであれば特に問わないが、特にフッ素ゴムは金属

に対して密着性を有しているため、請求項2に記載の発明のように、ゴムパッキンにフッ素ゴムを使用すると良い。つまり請求項2に記載の発明のようにゴムパッキンにフッ素ゴムを使用すれば、ゴムパッキンと金属製保護カバーの間、ゴムパッキンと外筒の間、及び、ゴムパッキンと保護外筒の間をそれぞれ十分に密着させることができる。その結果、外筒と保護外筒の間のをより確実にシールすることができる。

【0013】一方、金属製保護カバーとしては、ゴムパッキンとセバーラーの間に配置される金属製カバーであればどのようなものでもよく、例えば単なる筒状であってもセバーラーの変形を防ぐことはできる。しかし、単なる筒状ではゴムパッキンの熱膨張及び熱収縮による径方向の力は防げるが、軸方向の力は防げない。そのためセバーラーが軸方向に変形してしまう問題が残る。ところが、請求項3に記載の発明のように、筒部と、その筒部の軸方向一端側で周囲に張り出した鋸部とを有した金属製の保護カバーを、筒部を外筒の開口部に、鋸部をセバーラーの端面に装着すれば、ゴムパッキンの変形によるセバーラーへの径方向及び軸方向への力を、金属製保護カバーが効果的に防ぐことができる。それゆえセバーラーの軸方向への変形も防ぎ、ゴムパッキンと保護外筒の間及びゴムパッキンと外筒の間の空間が生じず、より外筒と保護外筒の間のシール性が向上する効果が得られる。

【0014】

【発明の実施の形態】以下に本発明を具体化した実施例を図面と共に説明する。尚、本実施例では本発明をガスセンサの一種である酸素センサに適用した。図1は本実施例の酸素センサ1の全体構成を示す断面図であり、図2は、図1におけるセバーラー16及びその周囲を拡大して表す拡大図である。

【0015】図1及び図2から明らかのように、本実施例の酸素センサ1は、基本的には図4に示した従来の酸素センサ2と同様に構成されており、従来の酸素センサ2との違いは、セバーラー16とゴムパッキン15との間に保護カバー24を備えている点だけである。そこで、以下の説明では、本実施例に酸素センサ1における保護カバー24及びその周辺部材（セバーラー16、ゴムパッキン15等）についてのみ図3を用いて説明し、それ以外の部分については、図1、図2に、従来の酸素センサ2と同一符号を付与し、説明は省略する。

【0016】まず、セバーラー16は、図3(a)に示すように、樹脂製の材質からなり径の異なる2種の円柱を、中心軸を捕えて重ねた形状をしている。また、その径の大きい側の円柱側面には、凹部16aを複数備えている。そして、リードフレーム25とリード線18を通しての孔16bを、軸方向に複数備えている。

【0017】次に、保護カバー24は、図3(b)に示すように、金属製の材質からなりセバーラー16の径の

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小さい側を内包できる径を有した筒部24bと、その軸方向一端側から周囲にセバレータ16を構成する二つの円柱の径差分だけ張り出した鈎部24aとを有している。そして、保護カバー24は、筒部24bがセバレータ16の径の小さい側を内包し、かつ、鈎部24aがセバレータ16の径の大きい円柱の端面に接するように、セバレータ16に装着されている(図1、図2参照)。

【0018】一方、ゴムパッキン15は、図3(c)に示すように、従来のものと同様、リング状に形成されており、本実施例では、その材質にフッ素ゴムが使用されている。そして、ゴムパッキン15は、保護カバー24の鈎部24aに接した状態で保護カバー24の筒部24bの外周に装着されている(図1、図2参照)。

【0019】さて、このようにして組み立てられて一体化したセバレータ16、保護カバー24及びゴムパッキンは、ゴムパッキン15が装着されている側を外筒13の主体金具とは反対側開口部に挿入する形で接合されている。そして、リードフレーム25及びリード線18が、前記セバレータの孔16b内に挿通され、それらが内部で電気的に接合されている。

【0020】また、筒状の保護外筒14が、セバレータ16の周囲及び、そのセバレータ16と外筒13との接合部を囲む形で装着されている。なお、保護外筒14の、外筒13と反対側開口部は、リード線18が内挿される形でゴムキャップ17によって気密にシールされている。

【0021】以上説明したように本実施例の酸素センサ1は、セバレータ16とゴムパッキン15との間に保護カバー24を挟んでいる。このため、ゴムパッキン15の熱膨張及び熱収縮によるセバレータ16に対する径方向及び軸方向の力を保護カバーが吸収できる。その結果、ゴムパッキン15の熱膨張及び熱収縮によるセバレータ16の変形が押さえられ、セバレータの変形による外筒13とゴムパッキン15との間及び、保護外筒14とゴムパッキン15との間に空間が生じることがなくなる。したがって、本実施例の酸素センサは、従来の酸素センサに比べ、外筒13と保護外筒14の間のシール性

を向上することができる。

【0022】また、本実施例においては、ゴムパッキン15の材質をフッ素ゴムとしているため、フッ素ゴムが有する特徴である金属に対する密着性により、ゴムパッキン15の、保護カバー24、外筒13及び保護外筒14に対する密着性を向上できる。したがって、本実施例の酸素センサは、ゴムパッキン15自体の特性によっても、外筒13と保護外筒14の間のシール性を向上することができる。

【0023】以上、本発明の実施例を説明したが、本発明は上記実施例に限定されるものではなく、種々の態様を探ることができる。例えば、保護カバー24として別に用意するのではなく、外筒13のセバレータ側端部を上記保護カバー24の形状にすることによっても、すでに本実施例で述べた同様の作用及び効果が得られる。

【0024】また、保護カバー24の鈎部24bを省いた簡単な保護カバーを利用することによっても、上記で述べた実施例より若干効果は劣るが、上記実施例に近い効果を得ることが可能となる。なお、実施例では検出素子として板形状の素子を用いた例を挙げたが、素子の形状としてはコップ状の素子を用いてもよい。

【図面の簡単な説明】

【図1】 実施例の酸素センサの全体構成を示す断面図である。

【図2】 図1におけるセバレータ16の部位を中心とした拡大した拡大図である。

【図3】 セバレータ16、保護カバー24及びゴムパッキン15を示す斜視図である。

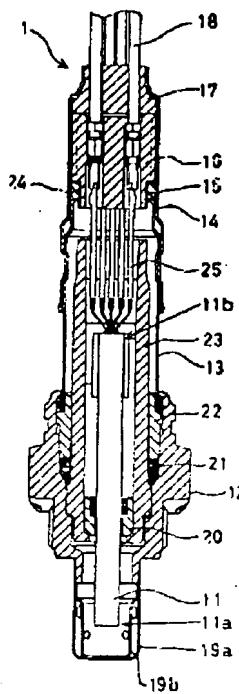
【図4】 従来の酸素センサの全体構成を示す断面図である。

【符号の説明】

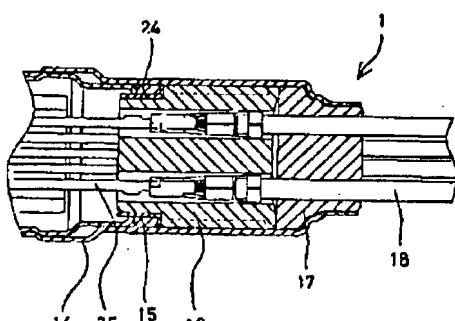
1…酸素センサ、11…検出素子、12…主体金具、13…外筒、14…保護外筒、15…ゴムパッキン、16…セバレータ、17…ゴムキャップ、18…リード線、19…プロテクタ、20…絶縁碍管、21…タルク粉末、22…固定部材、23…絶縁ホルダ、24…保護カバー、25…リードフレーム。

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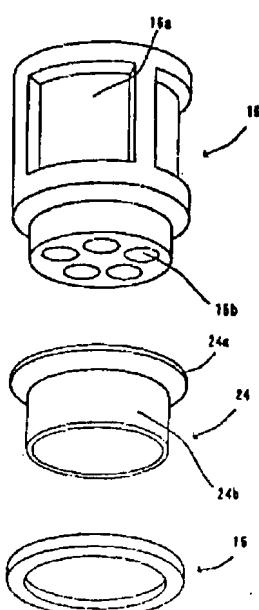
【図1】



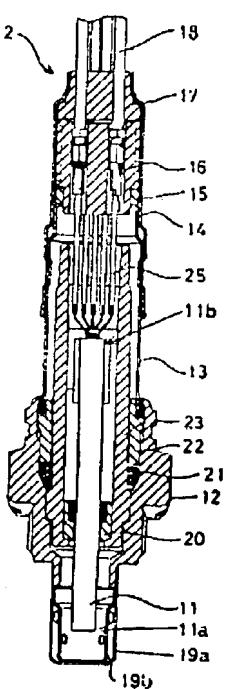
【図2】



【図3】



【図4】



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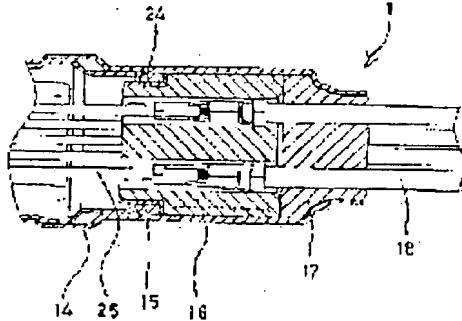
(21)Application number : 2001-229710 (71)Applicant : NGK SPARK PLUG CO LTD
 (22)Date of filing : 30.07.2001 (72)Inventor : IMAEDA KOICHI
 ISHIKAWA SATOSHI

(54) GAS SENSOR

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the sealability between an outer jacket and a protective outer jacket by suppressing the deformation of a separator in a gas sensor.

SOLUTION: The gas sensor 1 is provided with the separator 16 which protects the connection between a lead frame 25 connected to the electrode section 11b of a detecting element 11 and lead wires 18, and prevents the infiltration of water, oil, etc., into the sensor 1 from the space between the outer jacket 13 and the protective outer jacket 14 by means of a rubber packing 15 provided around the separator 16. The deformation of the separator 16 can be prevented by providing a metallic protective cover 24 between the separator 16 and packing 15. Consequently, the sealability between the jackets 13 and 14 is improved, because spaces do not occur between the jackets 13 and 14 and the packing 15 due to the deformation of the separator 16.



LEGAL STATUS

- [Date of request for examination]
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[Date of registration]

[Number of appeal against examiner's decision
of rejection]

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decision of rejection]

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2. **** shows the word which can not be translated.
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CLAIMS

[Claim(s)]

[Claim 1] The sensing element by which the detecting element was formed in the end of shaft orientations, and the electrode terminal for taking out the signal of said detecting element outside was connected to the other end, The tubed subject metallic ornaments which hold the shaft-orientations core of said sensing element in a hold hole, While the outer case which is joined to said electrode terminal side of said sensing element, and surrounds said electrode terminal side edge section of said sensing element to said subject metallic ornaments, and said subject metallic ornaments of said outer case blockade opposite side opening from an outside In order to protect the connection of said electrode terminal and lead wire which were projected from this opening While interpolation of said lead wire drawn from the separator made of resin which has a hole for inserting in said electrode terminal and said lead wire, and said separator made of resin is carried out The protection outer case arranged so that the perimeter of said separator made of resin may be protected, The rubber screen which interpolation of said lead wire is airtightly carried out, and carries out a seal to said outer case side from opposite side opening airtightly to said separator made of resin into said protection outer case, The gas sensor characterized by being arranged between said separators made of resin and said outer cases, being the rubber packing which carries out the seal of between said protection outer cases and said outer cases airtightly, and arranging the metal protective cover between said rubber packing and said separator made of resin.

[Claim 2] The gas sensor according to claim 1 characterized by said rubber packing being a fluororubber.

[Claim 3] It is the gas sensor according to claim 1 or 2 which said metal protective cover consists of a cylinder part and a flange jutted out over the perimeter by the shaft-orientations end side of this cylinder part, and said cylinder part is inserted in opening of said outer case, and is characterized by said flange being in contact with the end face of said separator.

DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention is attached in exhaust pipes, such as an internal combustion engine of an automobile, and relates to the gas sensor used for detecting the detected component in the exhaust gas which circulates the inside of an exhaust pipe.

[0002]

[Description of the Prior Art] As a gas sensor, the oxygen sensor 2 as shown, for example in

drawing 4 is known conventionally. Namely, as for an oxygen sensor 2, detecting-element 11a (in an oxygen sensor 2, the direction of detecting-element 11a is hereafter called a lower part side from a core) is prepared at a tip. The long tabular sensing element 11 by which polar-zone 11b (the direction of polar-zone 11b is hereafter called an upper part side from a core in an oxygen sensor 2) was installed in the back end, After detecting-element 11a had projected, the sensing element 11 was held, and it has the tubed subject metallic ornaments 12 attached in an exhaust pipe so that detecting-element 11a may be exposed into a measurement gas ambient atmosphere, and the bell shape outer case 13 connected to the polar-zone 11b side in the shape of [of the subject metallic ornaments 12] the same axle.

[0003] Among these, in an outer case 13, it has the insulating holder 23 which holds a sensing element 11 through the insulating porcelain tube 20. And the insulating holder 23 is attached in the subject metallic ornaments 12 through the talc powder 21 and a holddown member 22. Moreover, cylinder-like-object-with-base-like protector 19a and protector 19b of a duplex which were put on the lower part side edge section of the subject metallic ornaments 12 so that a detecting element might be surrounded are attached in the shape of the same axle.

[0004] On the other hand, it connected with polar-zone 11b of a sensing element 11 electrically within the outer case 13, and it connected with the leadframe 25 pulled out by the upper part from upper part side opening of an outer case 13, and this leadframe 25 electrically, and the oxygen sensor 2 is equipped with the lead wire 18 pulled out further outside.

[0005] In addition, the connection part of a leadframe 25 and lead wire 18 is protected with the separator 16. A separator 16 consists of the quality of the material made of resin, and it has the configuration where arranged the medial axis and two sorts of cylinders with which paths differ were piled up. And the separator 16 has prevented the short circuit of lead wire while it is equipped with two or more holes penetrated to shaft orientations and has protected the connection of a leadframe 25 and lead wire 18 inside the hole, in order to insert in the electrode terminal and lead wire 18 of a leadframe 25. In addition, this separator 16 inserts a small path side in an outer case 13, and the perimeter of a part for that insertion joint and a separator 16 is surrounded with the protection outer case 14. Moreover, in order to hold the airtightness between an outer case 13 and the protection outer case 14, the periphery of the small cylinder of the path of a separator 16 is equipped with the ring-like rubber packing 15.

[0006] Moreover, with the outer case 13 side of the protection outer case 14, opposite side opening is arranged so that a seal may be airtightly carried out by the rubber screen 17. In addition, the rubber screen 17 is interpolating lead wire 18 airtightly.

[0007]

[Problem(s) to be Solved by the Invention] By the way, since the above-mentioned oxygen sensor is exposed to an elevated temperature at the time of use, thermal expansion and a heat shrink according [rubber packing 15] to a temperature change happen. For this reason, rubber packing 15 might be made to transform the separator 16 which compressive stress has required. In addition, since rubber packing 15 has applied compressive stress in the direction of a path to the separator 16, the diameter of deformation of the separator 16 at this time is reduced. Moreover, with the separator 16, rubber packing 15 is sandwiched by a lower part side to the outer case 13 from the upper part side in shaft orientations. Therefore, by the thermal expansion and the heat shrink of rubber packing 15, although it is [some], a separator 16 deforms also into shaft orientations.

[0008] Consequently, in order to also reduce the diameter of rubber packing 15 with diameter

reduction of a separator 16, space is generated between the protection outer case 14 and rubber packing 15. Moreover, space produces rubber packing 15 also between an outer case 13 and rubber packing 15 in order to move in the form which sticks to the end face of the separator 16 which deformed into shaft orientations. Therefore, the seal nature between an outer case 13 and the protection outer case 14 gets worse. For this reason, conventionally, the heat-resistant resin (for example, PEEK material) which is not influenced by the thermal expansion of rubber packing and the heat shrink needed to be used for the separator, and it had become cost quantity. Moreover, it was possible to have solved a technical problem by forming a separator with ingredients, such as a ceramic, and the ceramic had the problem that it was divided with the impact from the outside, and also had the problem of being heavy. [0009] So, it aims at being able to maintain seal nature certainly, as a result offering a cheaper gas sensor as compared with the conventional gas sensor in this invention, without using the expensive separator made of heat-resistant resin which was being used for the conventional gas sensor.

[0010]

[The means for solving a technical problem, an effect of the invention] Invention according to claim 1 made in order to attain this purpose The sensing element by which the detecting element was formed in the end of shaft orientations, and the electrode terminal for taking out the signal of said detecting element outside was connected to the other end. The tubed subject metallic ornaments which hold the shaft-orientations core of said sensing element in a hold hole, While the outer case which is joined to said electrode terminal side of said sensing element, and surrounds said electrode terminal side edge section of said sensing element to said subject metallic ornaments, and said subject metallic ornaments of said outer case blockade opposite side opening from an outside In order to protect the connection of said electrode terminal and lead wire which were projected from this opening While interpolation of said lead wire drawn from the separator made of resin which has a hole for inserting in said electrode terminal and said lead wire, and said separator made of resin is carried out The protection outer case arranged so that the perimeter of said separator made of resin may be protected, The rubber screen which interpolation of said lead wire is airtightly carried out, and carries out a seal to said outer case side from opposite side opening airtightly to said resin separator into said protection outer case, It is the rubber packing which is arranged between said separators made of resin and said outer cases, and carries out the seal of between said protection outer cases and said outer cases airtightly, and is characterized by said rubber packing and arranging the metal protective cover between said separators made of resin.

[0011] That is, in the gas sensor of this invention (claim 1), since metal covering is prepared between a separator and rubber packing, even if rubber packing causes heat deformation, compressive stress does not join a separator. So, a separator does not produce deformation and there is no effect on the rubber packing accompanying deformation of a separator. Consequently, the effectiveness that space is not generated between an outer case and rubber packing and between a protection outer case and rubber packing, and the seal nature between an outer case and a protection outer case can be maintained is acquired.

[0012] Here, as the quality of the material of rubber packing, since the fluororubber has adhesion to the metal, it is good [it has elasticity, especially if the seal nature between two members is securable, it will not ask, but / especially / the fluororubber] like invention according to claim 2 to use a fluororubber for rubber packing. That is, if a fluororubber is used for rubber packing like invention according to claim 2, between rubber packing, between

metal protective covers and rubber packing, and outer cases and between rubber packing and protection outer cases can fully be stuck, respectively. Consequently, the seal of that between an outer case and a protection outer case can be carried out more certainly.

[0013] On the other hand, as long as it is metal covering arranged between rubber packing and a separator as a metal protective cover, what kind of thing may be used, for example, deformation of a separator can be prevented even if it is tubed [mere]. However, although the force of the direction of the mere path by the thermal expansion and the heat shrink of rubber packing if cylindrical can be prevented, the force of shaft orientations cannot be prevented. Therefore, the problem which a separator transforms into shaft orientations remains. However, if opening of an outer case is equipped with a cylinder part and the end face of a separator is equipped with a flange for a metal protective cover with a cylinder part and the flange jutted out over the perimeter by the shaft-orientations end side of the cylinder part like invention according to claim 3, a metal protective cover can prevent effectively the force to the direction of a path and shaft orientations to the separator by deformation of rubber packing. So, the deformation to the shaft orientations of a separator is also prevented, and the space between rubber packing and a protection outer case and between rubber packing and an outer case is not generated, but the effectiveness that the seal nature between an outer case and a protection outer case improves more is acquired.

[0014]

[Embodiment of the Invention] The example which materialized this invention is explained with a drawing below. In addition, in this example, this invention was applied to the oxygen sensor which is a kind of a gas sensor. Drawing 1 is the sectional view showing the whole oxygen sensor 1 configuration of this example, and drawing 2 is an enlarged drawing with which the separator 16 in drawing 1 and its perimeter are expanded and expressed.

[0015] Clearly from drawing 1 and drawing 2 like, the oxygen sensor 1 of this example is fundamentally constituted like the conventional oxygen sensor 2 shown in drawing 4, and the difference from the conventional oxygen sensor 2 is only the point of having the protective cover 24 between a separator 16 and rubber packing 15. So, in the following explanation, only the protective cover 24 in an oxygen sensor 1 and its edge strip (a separator 16, rubber packing 15 grade) are explained to this example using drawing 3, the same sign as the conventional oxygen sensor 2 is given to drawing 1 and drawing 2 about the other part, and explanation is omitted.

[0016] First, the separator 16 is carrying out the configuration where arranged the medial axis and two sorts of cylinders with which it consists of the quality of the material made of resin, and paths differ were piled up, as shown in drawing 3 (a). Moreover, the cylinder side face of a side with the large path is equipped with two or more crevice 16a. And shaft orientations are equipped with two or more hole 16b for letting a leadframe 25 and lead wire 18 pass.

[0017] Next, the protective cover 24 has flange 24a jutted out over the perimeter by the diameter difference of two cylinders which constitute a separator 16 from cylinder part 24b with the path which consists of the metal quality of the material, and can connote the small path side of a separator 16, and the shaft-orientations end side, as shown in drawing 3 (b). And the separator 16 is equipped with the protective cover 24 so that cylinder part 24b may connote the small path side of a separator 16 and flange 24a may touch the end face of the large cylinder of the path of a separator 16 (refer to drawing 1 and drawing 2).

[0018] On the other hand, as rubber packing 15 is shown in drawing 3 (c), like the conventional thing, it is formed in the shape of a ring, and the fluororubber is used for the

quality of the material by this example. And where flange 24a of a protective cover 24 is touched, the periphery of cylinder part 24b of a protective cover 24 is equipped with rubber packing 15 (refer to drawing 1 and drawing 2).

[0019] Now, it does in this way, is assembled and a separator 16, the unified protective cover 24, and unified rubber packing are joined in the form which inserts in opposite side opening the side equipped with rubber packing 15 with the subject metallic ornaments of an outer case 13. And a leadframe 25 and lead wire 18 are inserted in in hole 16b of said separator, and they are electrically joined inside.

[0020] Moreover, it is equipped with the tubed protection outer case 14 in the form surrounding the perimeter of a separator 16, and the joint of the separator 16 and outer case 13. In addition, the seal of the outer case 13 and opposite side opening of the protection outer case 14 is airtightly carried out by the rubber screen 17 in the form where interpolation of the lead wire 18 is carried out.

[0021] As explained above, the oxygen sensor 1 of this example has sandwiched the protective cover 24 between a separator 16 and rubber packing 15. For this reason, a protective cover can absorb the force of the direction of a path over the separator 16 by the thermal expansion and the heat shrink of rubber packing 15, and shaft orientations. Consequently, deformation of the separator 16 by the thermal expansion and the heat shrink of rubber packing 15 is pressed down, and it is lost that space is generated between the outer cases 13 and rubber packing 15 by deformation of a separator and between the protection outer case 14 and rubber packing 15. Therefore, the oxygen sensor of this example can improve the seal nature between an outer case 13 and the protection outer case 14 compared with the conventional oxygen sensor.

[0022] Moreover, in this example, since the quality of the material of rubber packing 15 is made into the fluororubber, the adhesion over the protective cover 24, the outer case 13, and the protection outer case 14 of rubber packing 15 can be improved by the adhesion over the metal which is the description which a fluororubber has. Therefore, the oxygen sensor of this example can improve the seal nature between an outer case 13 and the protection outer case 14 also with the property of rubber packing 15 the very thing.

[0023] As mentioned above, although the example of this invention was explained, this invention is not limited to the above-mentioned example, and can take various modes. For example, the same operation and the effectiveness which were already stated by this example are acquired also by independently not preparing as a protective cover 24, but making the separator side edge section of an outer case 13 into the configuration of the above-mentioned protective cover 24.

[0024] Moreover, although effectiveness is inferior to the example stated above also by using the simple protective cover which excluded flange 24b of a protective cover 24 a little, it becomes possible to acquire the effectiveness near the above-mentioned example. In addition, although the example which used the component of a plate configuration as a sensing element was given in the example, a cop-like component may be used as a configuration of a component.

TECHNICAL FIELD

[Field of the Invention] This invention is attached in exhaust pipes, such as an internal combustion engine of an automobile, and relates to the gas sensor used for detecting the detected component in the exhaust gas which circulates the inside of an exhaust pipe.

PRIOR ART

[Description of the Prior Art] As a gas sensor, the oxygen sensor 2 as shown, for example in drawing 4 is known conventionally. Namely, as for an oxygen sensor 2, detecting-element 11a (in an oxygen sensor 2, the direction of detecting-element 11a is hereafter called a lower part side from a core) is prepared at a tip. The long tabular sensing element 11 by which polar-zone 11b (the direction of polar-zone 11b is hereafter called an upper part side from a core in an oxygen sensor 2) was installed in the back end, After detecting-element 11a had projected, the sensing element 11 was held, and it has the tubed subject metallic ornaments 12 attached in an exhaust pipe so that detecting-element 11a may be exposed into a measurement gas ambient atmosphere, and the bell shape outer case 13 connected to the polar-zone 11b side in the shape of [of the subject metallic ornaments 12] the same axle.

[0003] Among these, in an outer case 13, it has the insulating holder 23 which holds a sensing element 11 through the insulating porcelain tube 20. And the insulating holder 23 is attached in the subject metallic ornaments 12 through the talc powder 21 and a holdown member 22. Moreover, cylinder-like-object-with-base-like protector 19a and protector 19b of a duplex which were put on the lower part side edge section of the subject metallic ornaments 12 so that a detecting element might be surrounded are attached in the shape of the same axle.

[0004] On the other hand, it connected with polar-zone 11b of a sensing element 11 electrically within the outer case 13, and it connected with the leadframe 25 pulled out by the upper part from upper part side opening of an outer case 13, and this leadframe 25 electrically, and the oxygen sensor 2 is equipped with the lead wire 18 pulled out further outside.

[0005] In addition, the connection part of a leadframe 25 and lead wire 18 is protected with the separator 16. A separator 16 consists of the quality of the material made of resin, and it has the configuration where arranged the medial axis and two sorts of cylinders with which paths differ were piled up. And the separator 16 has prevented the short circuit of lead wire while it is equipped with two or more holes penetrated to shaft orientations and has protected the connection of a leadframe 25 and lead wire 18 inside the hole, in order to insert in the electrode terminal and lead wire 18 of a leadframe 25. In addition, this separator 16 inserts a small path side in an outer case 13, and the perimeter of a part for that insertion joint and a separator 16 is surrounded with the protection outer case 14. Moreover, in order to hold the airtightness between an outer case 13 and the protection outer case 14, the periphery of the small cylinder of the path of a separator 16 is equipped with the ring-like rubber packing 15. [0006] Moreover, with the outer case 13 side of the protection outer case 14, opposite side opening is arranged so that a seal may be airtightly carried out by the rubber screen 17. In addition, the rubber screen 17 is interpolating lead wire 18 airtightly.

EFFECT OF THE INVENTION

[The means for solving a technical problem, an effect of the invention] Invention according to claim 1 made in order to attain this purpose The sensing element by which the detecting element was formed in the end of shaft orientations, and the electrode terminal for taking out the signal of said detecting element outside was connected to the other end, The tubed subject metallic ornaments which hold the shaft-orientations core of said sensing element in a hold hole, While the outer case which is joined to said electrode terminal side of said sensing element, and surrounds said electrode terminal side edge section of said sensing element to said subject metallic ornaments, and said subject metallic ornaments of said outer case blockade opposite side opening from an outside In order to protect the connection of said electrode terminal and lead wire which were projected from this opening While interpolation of said lead wire drawn from the separator made of resin which has a hole for inserting in said electrode terminal and said lead wire, and said separator made of resin is carried out The protection outer case arranged so that the perimeter of said separator made of resin may be protected, The rubber screen which interpolation of said lead wire is airtightly carried out, and carries out a seal to said outer case side from opposite side opening airtightly to said resin separator into said protection outer case, It is the rubber packing which is arranged between said separators made of resin and said outer cases, and carries out the seal of between said protection outer cases and said outer cases airtightly, and is characterized by said rubber packing and arranging the metal protective cover between said separators made of resin.

[0011] That is, in the gas sensor of this invention (claim 1), since metal covering is prepared between a separator and rubber packing, even if rubber packing causes heat deformation, compressive stress does not join a separator. So, a separator does not produce deformation and there is no effect on the rubber packing accompanying deformation of a separator. Consequently, the effectiveness that space is not generated between an outer case and rubber packing and between a protection outer case and rubber packing, and the seal nature between an outer case and a protection outer case can be maintained is acquired.

[0012] Here, as the quality of the material of rubber packing, since the fluororubber has adhesion to the metal, it is good [it has elasticity, especially if the seal nature between two members is securable, it will not ask, but / especially / the fluororubber] like invention according to claim 2 to use a fluororubber for rubber packing. That is, if a fluororubber is used for rubber packing like invention according to claim 2, between rubber packing, between metal protective covers and rubber packing, and outer cases and between rubber packing and protection outer cases can fully be stuck, respectively. Consequently; the seal of that between an outer case and a protection outer case can be carried out more certainly.

[0013] On the other hand, as long as it is metal covering arranged between rubber packing and a separator as a metal protective cover, what kind of thing may be used, for example, deformation of a separator can be prevented even if it is tubed [mere]. However, although the force of the direction of the mere path by the thermal expansion and the heat shrink of rubber packing if cylindrical can be prevented, the force of shaft orientations cannot be prevented. Therefore, the problem which a separator transforms into shaft orientations remains. However, if opening of an outer case is equipped with a cylinder part and the end face of a separator is equipped with a flange for a metal protective cover with a cylinder part and the flange jutted out over the perimeter by the shaft-orientations end side of the cylinder part like invention according to claim 3, a metal protective cover can prevent effectively the force to the direction of a path and shaft orientations to the separator by deformation of rubber packing. So, the deformation to the shaft orientations of a separator is also prevented, and the

space between rubber packing and a protection outer case and between rubber packing and an outer case is not generated, but the effectiveness that the seal nature between an outer case and a protection outer case improves more is acquired.

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[Embodiment of the Invention] The example which materialized this invention is explained with a drawing below. In addition, in this example, this invention was applied to the oxygen sensor which is a kind of a gas sensor. Drawing 1 is the sectional view showing the whole oxygen sensor 1 configuration of this example, and drawing 2 is an enlarged drawing with which the separator 16 in drawing 1 and its perimeter are expanded and expressed.

[0015] Clearly from drawing 1 and drawing 2 like, the oxygen sensor 1 of this example is fundamentally constituted like the conventional oxygen sensor 2 shown in drawing 4, and the difference from the conventional oxygen sensor 2 is only the point of having the protective cover 24 between a separator 16 and rubber packing 15. So, in the following explanation, only the protective cover 24 in an oxygen sensor 1 and its edge strip (a separator 16, rubber packing 15 grade) are explained to this example using drawing 3, the same sign as the conventional oxygen sensor 2 is given to drawing 1 and drawing 2 about the other part, and explanation is omitted.

[0016] First, the separator 16 is carrying out the configuration where arranged the medial axis and two sorts of cylinders with which it consists of the quality of the material made of resin, and paths differ were piled up, as shown in drawing 3 (a). Moreover, the cylinder side face of a side with the large path is equipped with two or more crevice 16a. And shaft orientations are equipped with two or more hole 16b for letting a leadframe 25 and lead wire 18 pass.

[0017] Next, the protective cover 24 has flange 24a jutted out over the perimeter by the diameter difference of two cylinders which constitute a separator 16 from cylinder part 24b with the path which consists of the metal quality of the material, and can connote the small path side of a separator 16, and the shaft-orientations end side, as shown in drawing 3 (b). And the separator 16 is equipped with the protective cover 24 so that cylinder part 24b may connote the small path side of a separator 16 and flange 24a may touch the end face of the large cylinder of the path of a separator 16 (refer to drawing 1 and drawing 2).

[0018] On the other hand, as rubber packing 15 is shown in drawing 3 (c), like the conventional thing, it is formed in the shape of a ring, and the fluororubber is used for the quality of the material by this example. And where flange 24a of a protective cover 24 is touched, the periphery of cylinder part 24b of a protective cover 24 is equipped with rubber packing 15 (refer to drawing 1 and drawing 2).

[0019] Now, it does in this way, is assembled and a separator 16, the unified protective cover 24, and unified rubber packing are joined in the form which inserts in opposite side opening the side equipped with rubber packing 15 with the subject metallic ornaments of an outer case 13. And a leadframe 25 and lead wire 18 are inserted in in hole 16b of said separator, and they are electrically joined inside.

[0020] Moreover, it is equipped with the tubed protection outer case 14 in the form surrounding the perimeter of a separator 16, and the joint of the separator 16 and outer case 13. In addition, the seal of the outer case 13 and opposite side opening of the protection outer case 14 is airtightly carried out by the rubber screen 17 in the form where interpolation of the lead wire 18 is carried out.

[0021] As explained above, the oxygen sensor 1 of this example has sandwiched the protective cover 24 between a separator 16 and rubber packing 15. For this reason, a

protective cover can absorb the force of the direction of a path over the separator 16 by the thermal expansion and the heat shrink of rubber packing 15, and shaft orientations. Consequently, deformation of the separator 16 by the thermal expansion and the heat shrink of rubber packing 15 is pressed down, and it is lost that space is generated between the outer cases 13 and rubber packing 15 by deformation of a separator and between the protection outer case 14 and rubber packing 15. Therefore, the oxygen sensor of this example can improve the seal nature between an outer case 13 and the protection outer case 14 compared with the conventional oxygen sensor.

[0022] Moreover, in this example, since the quality of the material of rubber packing 15 is made into the fluororubber, the adhesion over the protective cover 24, the outer case 13, and the protection outer case 14 of rubber packing 15 can be improved by the adhesion over the metal which is the description which a fluororubber has. Therefore, the oxygen sensor of this example can improve the seal nature between an outer case 13 and the protection outer case 14 also with the property of rubber packing 15 the very thing.

[0023] As mentioned above, although the example of this invention was explained, this invention is not limited to the above-mentioned example, and can take various modes. For example, the same operation and the effectiveness which were already stated by this example are acquired also by independently not preparing as a protective cover 24, but making the separator side edge section of an outer case 13 into the configuration of the above-mentioned protective cover 24.

[0024] Moreover, although effectiveness is inferior to the example stated above also by using the simple protective cover which excluded flange 24b of a protective cover 24 a little, it becomes possible to acquire the effectiveness near the above-mentioned example. In addition, although the example which used the component of a plate configuration as a sensing element was given in the example, a cop-like component may be used as a configuration of a component.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, since the above-mentioned oxygen sensor is exposed to an elevated temperature at the time of use, thermal expansion and a heat shrink according [rubber packing 15] to a temperature change happen. For this reason, rubber packing 15 might be made to transform the separator 16 which compressive stress has required. In addition, since rubber packing 15 has applied compressive stress in the direction of a path to the separator 16, the diameter of deformation of the separator 16 at this time is reduced. Moreover, with the separator 16, rubber packing 15 is sandwiched by a lower part side to the outer case 13 from the upper part side in shaft orientations. Therefore, by the thermal expansion and the heat shrink of rubber packing 15, although it is [some], a separator 16 deforms also into shaft orientations.

[0008] Consequently, in order to also reduce the diameter of rubber packing 15 with diameter reduction of a separator 16, space is generated between the protection outer case 14 and rubber packing 15. Moreover, space produces rubber packing 15 also between an outer case 13 and rubber packing 15 in order to move in the form which sticks to the end face of the separator 16 which deformed into shaft orientations. Therefore, the seal nature between an outer case 13 and the protection outer case 14 gets worse. For this reason, conventionally, the

heat-resistant resin (for example, PEEK material) which is not influenced by the thermal expansion of rubber packing and the heat shrink needed to be used for the separator, and it had become cost quantity. Moreover, it was possible to have solved a technical problem by forming a separator with ingredients, such as a ceramic, and the ceramic had the problem that it was divided with the impact from the outside, and also had the problem of being heavy. [0009] So, it aims at being able to maintain seal nature certainly, as a result offering a cheaper gas sensor as compared with the conventional gas sensor in this invention, without using the expensive separator made of heat-resistant resin which was being used for the conventional gas sensor.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing the whole oxygen sensor configuration of an example.

[Drawing 2] It is the enlarged drawing expanded centering on the part of the separator 16 in drawing 1.

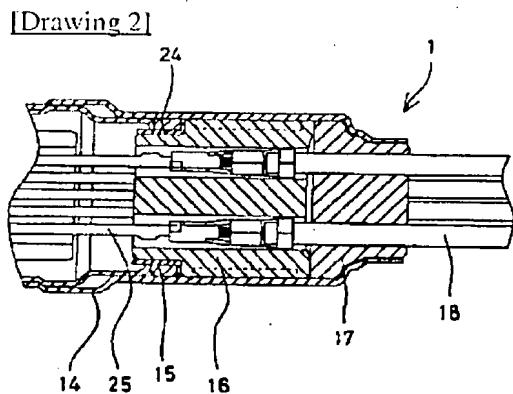
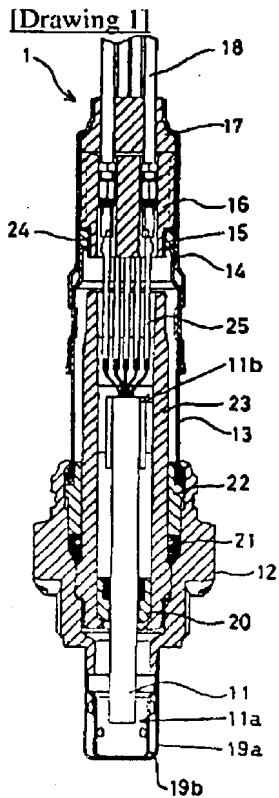
[Drawing 3] It is the perspective view showing a separator 16, a protective cover 24, and rubber packing 15.

[Drawing 4] It is the sectional view showing the conventional oxygen sensor whole configuration.

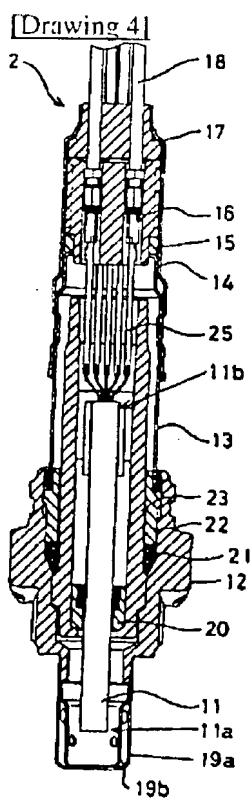
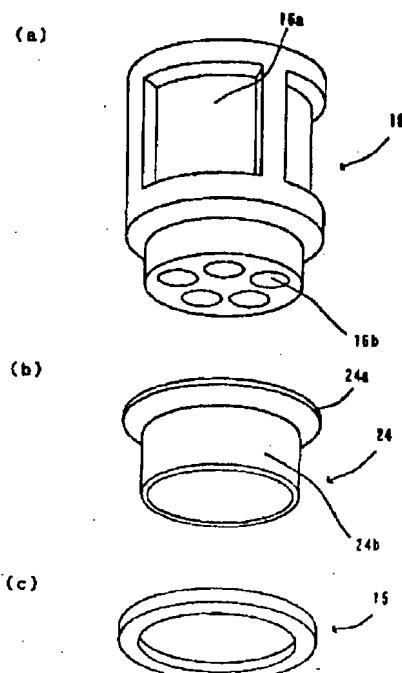
[Description of Notations]

1 [-- A protection outer case, 15 / -- Rubber packing, 16 / -- A separator, 17 / -- A rubber screen, 18 / -- Lead wire, 19 / -- A protector, 20 / -- An insulating porcelain tube, 21 / -- Talc powder, 22 / -- A holddown member, 23 / -- An insulating holder, 24 / -- A protective cover, 25 / -- Leadframe.] -- An oxygen sensor, 11 -- sensing element, 12 -- Subject metallic ornaments, 13 -- An outer case, 14

DRAWINGS



[Drawing 3]



[Translation done.]